

[SPECIFICATION]

[TITLE OF THE INVENTION]

Construction of tub cover of full automatic washing machine

[BRIEF DESCRIPTION OF THE DRAWINGS]

FIG. 1 is a sectional view illustrating a washing machine of the related art;

FIG. 2 is a disassembled view illustrating upper and lower tub covers of a washing machine, a portion of which is cut off, in accordance with the present invention;

FIG. 3 is a sectional view illustrating upper and lower tub covers being united to a washing machine in accordance with the present invention;

FIG. 4 is an enlarged view of upper and lower tub covers being united to a washing machine in accordance with the first embodiment of the present invention;

FIG. 5 is an enlarged view of upper and lower tub covers being united to a washing machine in accordance with the second embodiment of the present invention;

FIG. 6 is a perspective view of a guide rib being coupled to a tub cover in accordance with the third embodiment of the present invention;

FIG. 7 is a bottom view of a tub cover showing the guide rib of FIG. 6;

FIG. 8 is a sectional view illustrating an operation of the guide rib of FIG. 6.

FIG. 9 is a perspective view illustrating a guide rib being coupled to a tub cover in accordance with the fourth embodiment of the present invention;

FIG. 10 is a bottom view of a tub cover showing the guide rib of FIG. 9 and a water accumulating plate; and

FIG. 11 is a sectional view illustrating the operation of the guide rib and the water accumulating plate of FIG. 9.

- Description of reference numerals for main parts in the drawings.

101: washing machine

102: outer tub  
103: inner tub  
104: fluid balancer  
105: pulsator  
106: driving shaft  
107: motor  
111: upper tub cover  
112: first through hole  
113: first screw  
121: lower tub cover  
122: first interval maintaining rib  
123: first screw hole  
131: second interval maintaining rib  
132: second screw hole  
141: second through hole  
142: second screw  
201: tub cover  
202: guide rib  
204: water accumulating plate

**[DETAILED DESCRIPTION OF THE INVENTION]**

**[OBJECT OF THE INVENTION]**

**[FIELD OF THE INVENTION AND DISCUSSION OF THE RELATED ART]**

The present invention relates to a full automatic washing machine, and more particularly, to a construction of a full automatic washing machine in which an upper tub cover is coupled to the upper part of the outer tub and a lower tub cover is coupled to the

upper tub cover with constant intervals or a plurality of guide ribs are integrally formed with a tub cover, whereby washing water is efficiently provided to an inner tub by being pushed to the upper part of the inner and outer tubs by a centrifugal force generated by rapid regular and reverse rotations by the inner tub.

FIG. 1 is a sectional view of a related art pulsator washing machine based on an agitation type. The washing machine 1 includes an outer tub 2, an inner tub 3, a pulsator 4, a washing shaft 6, a dewatering shaft 6-1, a clutch 7, a motor 8, and a drain valve 9. The outer tub 2 is for storing washing water. The inner tub 3 is installed inside the outer tub 2 for washing laundry. The pulsator 4 is installed on the inner bottom face of the inner tub 3 for performing the agitation washing process by providing a mechanical rotating force to the laundry by rotating in regular and reverse directions. The washing shaft 6 is coupled to the pulsator 4 for rotating the pulsator 4 in the regular and reverse directions. The dewatering shaft 6-1 is coupled to the inner tub 3 for rotating the inner tub in one direction. The clutch 7 couples the washing shaft 6 with the dewatering shaft 6-1 or separates them from each other. The motor 8 is connected to the clutch 7 by a belt and delivers the rotating force to drive the clutch 7. The drain valve 9 is coupled to the outer tub 2 to discharge the washing water in the outer tub 2 out of the washing machine.

An operation of the related art washing machine will be described below.

First, laundry is put into an inner tub 3 of a washing machine and washing water is provided when a start button is pressed. When more than a certain amount of washing water is provided into the inner and outer tubs 3 and 2, water supply is stopped by a sensor.

At the same time as the water supply is stopped, the motor 8 rotates in regular and reverse directions to rotate the washing shaft 6 in regular and reverse directions as well.

Accordingly, the pulsator 4 being connected to the washing shaft 6 is rotated in both regular and reverse directions, thereby performing the washing process.

When the washing process is completed, the drain valve 9 is opened to drain the washing water in the outer tub 2, thereby performing the draining process.

To perform the dewatering process after the draining process is completed, the inner tub 3 and the pulsator 4 rapidly rotate together in one direction in a state that the washing shaft 6 and the dewatering shaft 6-1 are coupled with each other. In this way, the washing water in the inner tub 3 is drained to the outer tub 2 through a plurality of washing holes 5 and the washing water drained to the outer tub 2 is drained out of the washing machine through the drain valve 10.

In the related art washing machine, however, as the washing process is performed by the agitation caused by the regular and reverse rotations of the pulsator, damage to and entangling of the laundry inevitably comes to occur.

Also, because a lot of washing water need to be provided to the outer tub 2 to wash and rinse the laundry, the amount of the washing water and detergent and time for supplying and draining washing water are increased.

#### **[TECHNICAL TASKS TO BE ACHIEVED BY THE INVENTION]**

Accordingly, the present invention is directed to a construction of a tub cover of a full automatic washing machine that substantially obviates one or more problems due to limitations and disadvantages of the prior art.

An object of the present invention is to provide a washing machine having a high pumping efficiency of washing water by guiding and providing washing water to the upper part of the inner tub, the washing water going up to the upper part between inner and outer tubs by rapid regular and reverse rotations of the inner tub.

Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention.

The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, in a washing machine of the present invention, an upper tub cover is coupled to an outer tub and a passage is formed between upper and lower tub covers by coupling the lower tub cover to the upper tub cover. Alternatively, a plurality of guide ribs are integrally formed with the tub cover to make washing water-flow smoothly.

#### **[PREFERRED EMBODIMENTS OF THE INVENTION]**

Constructions of a tub cover in accordance with first and second embodiments of the present invention will be described with reference to FIGs. 2 to 5.

In the figures, the tub cover includes an upper tub cover 111, a lower tub cover 121, and a connecting means. The upper tub cover 111 coupled to outer tub 102 guides and provides washing water to inner tub 103, the washing water going up to the interval of inner and outer tubs 103 and 102 by the centrifugal force generated by the rapid rotation of the inner tub 103 coupled to a washing machine. The lower tub cover 121 is coupled to the upper tub cover 111 to increase the pumping efficiency of the washing water being guided by the upper tub cover 111. The connecting means of the lower tub cover couples the lower tub cover 121 with the upper tub cover 111.

At this time, the connecting means includes a plurality of first interval maintaining ribs 122, first screw holes 123, first through holes 112, and first screws 113. A plurality of the first interval maintaining ribs 122 are formed on the lower tub cover 121 for maintaining intervals between the lower and upper tub covers 121 and 111. A plurality of the first screw holes 123 are formed on the first interval maintaining ribs 122. A plurality of the first through

holes 112 are formed on the upper tub cover 111 to be accord with the first screw holes 123. A plurality of the first screws 113 are integrally formed with the first through holes 112 and fastened to the first screw holes 123.

Also, the connecting means of the lower tub cover includes a plurality of second interval maintaining ribs 131, second screw holes 132, second through holes 141, and second screws 142. A plurality of the second interval maintaining ribs 131 are formed on the lower tub cover 121 for maintaining intervals between the lower and upper tub covers 121 and 111. A plurality of the second screw holes 132 are formed on the second interval maintaining ribs 131. A plurality of the second through holes 141 are formed on the upper tub cover 111 to be accord with the second screw holes 132. A plurality of the second screws 142 are integrally formed with the second through holes 141 and fastened to the second screw holes 132.

Constructions of a tub cover in accordance with third and fourth embodiments of the present invention will be described with reference to FIGs. 6 to 11.

The figures are tub covers of a washing machine being provided with a plurality of guide ribs 202 being integrally formed with a tub cover 201. The guide ribs guide and provide washing water going up to the interval of inner and outer tubs 103 and 102 by the centrifugal force generated by rapid rotations of the inner tub 103.

Also, a plurality of lead ribs 203 are connected to the guide ribs 202 for leading the washing water while reducing the resistance between the guide ribs 202 and washing water being pumped through the interval of inner and outer tubs 103 and 102 by regular and reverse rotations of the inter tub 103.

The guide and lead ribs 202 and 203 are formed in a "Y" shape.

Additionally, a water accumulating plate 204 is formed on the guide and lead ribs 202 and 203 to provide the washing water being provided to the guide and lead ribs 202 and 203 accurately to the inner tub 103 preventing the washing water from dropping to the lower part.

An operation of a tub cover of a washing machine of the present invention will be described below.

FIG. 3 is a sectional view illustrating a washing machine with upper and lower tub covers.

First, laundry is put into an inner tub 104 of a washing machine 101. Then, washing water is provided when a start button is pressed. When more than a certain amount of washing water is provided in the inner tub 104 and an outer tub 105, water supply is stopped and the washing cycle is started. The washing cycle is performed by the rotation of a motor 102. That is, a driving shaft 103 is rotated in regular and reverse directions by regular and reverse rotations of the motor 102 and the inner tub 104 is rotated in regular and reverse directions by the regular and reverse rotations of the driving shaft 103.

In this way, the washing operation is performed by a water flow of the washing water, the water flow being generated by regular and reverse rotations of the inner tub 104. At this time, the number of the rotation of the motor 102 need to increase. That is, when the number of the rotation of the motor 102 fully increases, the number of rotation of the driving shaft 103 and the inner tub 104 increase as well, thereby strengthening the centrifugal force. Accordingly, the laundry is pushed to the inner faces of the inner tub 104 by the centrifugal force and the washing water passes through textures of the laundry. In this way, the laundry is washed better as contaminants on the laundry is peeled off by the washing water passing through the textures of it.

The washing water which passed through the textures of the laundry is drained to the outer tub 105 through washing holes of the inner tub 104. Then, the washing water drained to the outer tub 105 goes up along the interval of the inner and outer tubs 104 and 105 by the centrifugal force generated by the rapid rotation of the inner tub 104. Of course, the washing water provided on the bottom face of the outer tub 105 also goes up to the upper part along

the interval of the inner and outer tubs 104 and 105 by the centrifugal force.

The ascended washing water is guided by the upper and lower tub covers 111 and 121. Accordingly, the washing water passing through between the upper and lower tub covers 111 and 121 is promptly moved and provided to the inner tub 103; thereby increasing the pumping efficiency.

In the mean time, upper surface intervals S of the upper and lower tub covers 111 and 121 are uniformly maintained by a plurality of first interval maintaining ribs 122 being formed on the lower tub cover 121. Also, washing water pressure being pumped is controlled by adjusting the length of the first interval maintaining ribs 122 longer or shorter.

Also, as shown in FIG. 4, in the first embodiment of the present invention, a plurality of first screw holes 123 on the first interval maintaining ribs 122 and a plurality of first through holes 112 on the upper tub cover 111 are accorded and then, fastened by a plurality of first screws 113. Accordingly, a firm fastening structure is obtained.

In the mean time, upper surface intervals S of the upper and lower tub covers 111 and 121 are uniformly maintained by a plurality of second interval maintaining ribs 131 being formed on the upper tub cover 111. Also, washing water pressure is controlled by adjusting the length of the second interval maintaining ribs 131 longer or shorter.

In the washing machine of the first embodiment, however, the washing water being circulated can be leaked through the first through holes 112 because the first through holes are formed on the upper tub cover 111.

If the washing water is leaked, it may be splashed out of the outer tub 102. In this case, the washing water is dropped on a floor on which the washing machine is installed, causing a lot of inconveniences. Also, when a motor or a drain motor inside the washing machine 101 comes in contact with the washing water, the insulating resistance of it decreases and there is a possibility of an electric shock and component damage.

Accordingly, the second embodiment of the present invention is suggested.

As shown in FIG. 5, in the second embodiment, a plurality of second screw holes 132 being formed on the second interval maintaining ribs 131 and a plurality of second through holes 141 being formed on the lower tub cover 121 are accorded and then, fastened by a plurality of second screws 113, thereby obtaining a firm fastening structure. In addition, the washing water is prevented from dropping into the inter tub 103 even though the washing water being circulated is leaked through the second through holes 141 being formed on the lower tub cover 121.

Also, thanks to a plurality of reinforcing ribs 124 being formed on a bent part of the lower tub cover 121, the washing machine is protected from outer shocks or vibrations.

As the washing water which passed through the upper and lower tub covers 111 and 121 is provided to the inner tub 103, the washing water has a high water level when it is dropped from the upper part of the inner tub 103 to the inside of the inner tub 103. Accordingly, the washing water gives a great impact to the laundry.

FIGs. 6 to 8 and FIGs. 9 to 11 describe the third and fourth embodiments of the present invention.

In the third embodiment of the present invention, as shown in FIGs. 6 to 8, a plurality of guide ribs 202 are formed on a tub cover 201. Accordingly, as shown in FIG. 8, washing water going up to the interval of inner and outer tubs 103 and 102 by a guide rib 202 is guided to the center of an inner tub 103, thereby accurately providing the washing water into the inner tub 103.

In the fourth embodiment of the present invention, as shown in FIGs. 9 to 11, a lead rib 203 of "Y" shape is formed for guiding washing water to the guide rib 202 while reducing the resistance. Accordingly, more washing water is provided to the guide rib 202 smoothly.

Also, because of a water accumulating plate 204 coupled to a bottom of the lead and

guide ribs, the washing water provided to the lead and guide ribs 203 and 202 is accurately provided to the inner tub 103 without being dropped down. In this way, more washing water is provided to the inner tub 103 by an improved pumping efficiency.

#### **[ADVANTAGE OF THE INVENTION]**

In a washing machine of the present invention, an upper tub cover is coupled to an outer tub and a passage is formed between upper and lower tub covers by coupling the lower tub cover to the upper tub cover. Alternatively, a plurality of guide ribs are integrally formed with the tub cover to make washing water flow smoothly. Accordingly, a washing machine of the present invention has a high pumping efficiency of washing water by guiding and providing washing water to the upper part of the inner tub, the washing water going up to the upper part between inner and outer tubs by rapid regular and reverse rotations of the inner tub.